

## REMARKS

Claims 7-10 and 46-61 are all the claims presently pending in the application. Claims 7-10 have been withdrawn. Claim 46 has been amended to more particularly define the claimed invention. Claims 59-61 have been added.

Applicant notes that support for “*in a horizontal cross section, the recess comprises a maximum inside dimension nearly equal to a diagonal dimension of the semiconductor light-emitting element while housing the semiconductor light-emitting element*” can be found in the Application, for example, at page 12, line 29 to page 13, line 2, page 16, lines 2-6, and FIGS. 5C and 6.

It is noted that the claim amendments are made only for more particularly pointing out the invention, and not for distinguishing the invention over the prior art, narrowing the claims or for any statutory requirements of patentability. Further, Applicant specifically states that no amendment to any claim herein should be construed as a disclaimer of any interest in or right to an equivalent of any element or feature of the amended claim.

**Claims 46-48 and 51-55** stand rejected under 35 U. S. C. §102(b) as allegedly being anticipated by Soules (U. S. Patent No. 6,252,254).

**Claims 49-50** stand rejected under 35 U. S. C. §103(a) as allegedly unpatentable over Soules in view of Roberts et al. (U. S. Patent No. 6,335,548).

**Claims 56-58** stand rejected under 35 U. S. C. §103(a) as allegedly unpatentable over Soules in view of Chen (U. S. Patent No. 6,531,328).

These rejections are respectfully traversed in view of the following discussion.

### **I. EXEMPLARY ASPECTS OF THE CLAIMED INVENTION**

An exemplary aspect of the claimed invention (e.g., as recited, for example, in claim 1) is directed to a light-emitting apparatus, including a semiconductor light-emitting element that emits light with a predetermined wavelength, and an external lens having a light convergence shape to converge light emitted from the semiconductor light-emitting element. The external lens includes a recess to house the semiconductor light-emitting element, and a phosphor layer portion that is formed on a surface of the

recess, the phosphor layer portion including a phosphor to be excited by irradiating light emitted from the semiconductor light-emitting element. Further, the recess is closely disposed surrounding the light-emitting element such that the light convergence shape converges light radiated from the phosphor layer portion into a spot of light.

Importantly, in a horizontal cross section, the recess includes a maximum inside dimension nearly equal to a diagonal dimension of the semiconductor light-emitting element while housing the semiconductor light-emitting element (Application at page 12, line 29-page 13, line 2; page 16, lines 2-6; and Figures 5C and 6).

A conventional apparatus (e.g., see Application at Figure 4A) may include a light emitting diode (LED) 60 integrally formed with light source 62, and a lens element 72. However, since in such an apparatus the light source 62 and lens element 72 are positioned using posts 70, 71 and recesses 62A, 62B (Application at Figure 4B), it is difficult to adjust the positioning precision of the light source 62 and lens element 72. (Application at page 5, lines 1-5).

In the claimed invention, on the other hand, in a horizontal cross section, the recess includes a maximum inside dimension nearly equal to a diagonal dimension of the semiconductor light-emitting element while housing the semiconductor light-emitting element (Application at page 12, line 29-page 13, line 2; page 16, lines 2-6; and Figures 5C and 6).

Advantages of an exemplary aspect of the claimed invention are describe in the Application, for example, at page 14, line 17-page 15, line 3; and page 15, line 29-page 16, line 6, which states that since the external lens 5 is provided with the LED housing recess 50 and it is closely disposed surrounding the LED element 4 while providing the surface of LED housing recess 50 with the phosphor layer 5A, the phosphor layer 5A can be formed as a uniform and thin layer. With a uniform and thin phosphor layer 5A, the lowering of light intensity due to light absorption can be prevented. Also, since the size of light source can be minimized substantially without being influenced by the thickness of phosphor layer 5A, light radiated from the light source can be sufficiently converged like a spot by the converging optical system. Thereby, the light intensity in a predetermined lighting range can be increased.

The Application further describes the exemplary aspect by stating that even when a large size LED element 4 (e.g., 1000  $\mu\text{m}$  square) is used, a good convergence characteristic can be secured while suppressing the enlargement of light source size caused by covering the light source with phosphor layer 5A (Application at page 14, line 17 to page 15, line 3).

The Application further describes the exemplary aspect by stating that in a second embodiment, the LED housing recess 50 of lens 5 surrounding the LED element 4 may be formed such that it has a rectangular shape similar to the shape of LED element 4. A gap between the LED element A and the phosphor layer 5A is further narrowed and, therefore the enlargement of light source size can be more effectively suppressed and the convergence characteristic of light radiated can be further enhanced (Application at page 16, lines 2-6).

## **II. THE ALLEGED PRIOR ART REFERENCES**

### **A. Soules**

The Examiner alleges that Soules teaches the invention of claims 46-48 and 51-55. Applicant would submit, however, that there are features of the claimed invention that are not taught or suggested by Soules.

Moreover, Applicant would submit that Soules does not teach or suggest an external lens including a recess, "*wherein in a horizontal cross section, the recess comprises a maximum inside dimension nearly equal to a diagonal dimension of the semiconductor light-emitting element while housing the semiconductor light-emitting element*", as recited in claim 46 (Application at page 12, line 29-page 13, line 2; page 16, lines 2-6; and Figures 5C and 6). As noted above, this may help to effectively suppress an enlargement of light source size and further enhance the convergence characteristic of light radiated.

Clearly, Soules does not teach or suggest this novel feature.

Indeed, Soules is silent about the positional relationship between the semiconductor light-emitting element and the recess in horizontal cross section. Thus, Soules does not consider the positional relationship therebetween so that phosphor-

containing layer or covering (14) or (15) thereof will be expanded in the horizontal direction. As a result, Soules fails to have the light converging effect even by using the converging optical system as illustrated in FIG. 3B of Application. This is because the phosphor-containing layer or covering (14) or (15) functions as a substantial light-emission source by emitting a fluorescence when irradiated and excited by light emitted from LED.

By contrast, the recess (with the phosphor layer) of the invention is brought to the LED as close as possible such that the phosphor layer is not expanded in the horizontal direction (See Application at page 12, line 29 to page 13, line 2, page 16, lines 2-6, and FIGS. 5C and 6). Therefore, the light-emitting apparatus of the claimed invention can have the light converging effect by effectively using a converging optical system (e.g., the converging optical system (lens (5)) as illustrated in FIG.3A of Application).

Further, Soules simply discloses a light emitting device including a laser diode 32, scattering particles embedded in a material 38, a phosphor layer 34 and a transmissive body 36 (Soules at Figure 3). The Examiner surprisingly attempts to equate the lens 16 in Soules with the external lens of the claimed invention. This is completely unreasonable.

Indeed, Applicant would first point out that Soules teaches a phosphor-coated LED, and a polymer lens 16 which is molded over the phosphor-coated LED 12 (Soules at col. 3, lines 45-56). In contrast, in the claimed invention, a phosphor layer portion is formed on a surface of recess in the lens. Thus, the claimed invention is completely unrelated to the phosphor-coated LED of Soules.

Second, Applicant would point out that Soules simply illustrates a side view of the lens on the phosphor-coated LED. That is, even assuming (arguendo) that the lens 16 in Soules includes a recess, nowhere does Soules teach or suggest anything about a maximum inside dimension of a recess in the lens 16. Thus Soules certainly does not teach or suggest that in a horizontal cross section, the recess includes a maximum inside dimension nearly equal to a diagonal dimension of the semiconductor light-emitting element while housing the semiconductor light-emitting element, as in the claimed

invention.

Further, with respect to claim 47, the Examiner alleges that Soules "shows connections on opposite side of emission, which is a 'flip chip'". However, nowhere does Soules show such a connection as alleged by the Examiner.

Further, with respect to claim 54, Applicant notes that claim 54 recites "*an electrode, said light-emitting element being formed on said electrode, and said external lens being affixed to said electrode by a sealant formed on said light-emitting element*". The Examiner alleges that this feature is inherent which is completely unreasonable.

Indeed, Applicant would point out that MPEP 2112 (IV) provides that **the fact that a certain result or characteristic may occur or be present in the prior art is not sufficient** to establish the inherency of that result or characteristic. (e.g., see *In re Rijckaert*, 9 F.3d 1531, 1534, 28 USPQ2d 1955, 1957 (Fed. Cir. 1993). That is, inherency, may not be established by probabilities or possibilities (e.g., see *In re Robertson*, 169 F.3d 743, 745, 49 USPQ2d 1949, 1950-51 (Fed. Cir. 1999)).

Further, MPEP 2112 (IV) also provides that in relying upon the theory of inherency, **the examiner must provide a basis in fact and/or technical reasoning to reasonably support the determination that the allegedly inherent characteristic necessarily flows from the teachings of the applied prior art.** (e.g., see *Ex parte Levy*, 17 USPQ2d 1461, 1464 (Bd. Pat. App. & Inter. 1990).

However, in this case, the Examiner has failed to provide any basis to support his assertion that the phosphor-coated LED in Soules would necessarily be "mounted on" an electrode, or that the lens 16 would necessarily be "affixed to the electrode by a sealant". Indeed, Applicant would point out that these features are clearly not necessary in the Soules device. Therefore, the Examiner has failed to show that the features are inherent.

Therefore, Applicant would submit that there are features of the claimed invention that are not taught or suggested by Soules. Therefore, the Examiner is respectfully requested to withdraw this rejection.

**B. Roberts and Chen**

The Examiner alleges that Soules would have been combined with Roberts to form the claimed invention of claims 49-50, and with Chen to form the invention of claims 56-58. Applicant would submit, however, that these references would not have been combined and even if combined, the combination would not teach or suggest each and every feature of the claimed invention.

In particular, Applicant respectfully submits that these references are unrelated. Indeed, no person of ordinary skill in the art would have considered combining these disparate references, absent impermissible hindsight.

In fact, Applicant submits that the references provide no motivation or suggestion to urge the combination as alleged by the Examiner. Indeed, these references clearly do not teach or suggest their combination. Therefore, Applicant respectfully submits that one of ordinary skill in the art would not have been so motivated to combine the references as alleged by the Examiner. Therefore, the Examiner has failed to make a prima facie case of obviousness.

Moreover, Applicant would submit that neither Soules, nor Roberts, nor Chen, nor any alleged combination thereof teaches or suggests an external lens including a recess, "*wherein in a horizontal cross section, the recess comprises a maximum inside dimension nearly equal to a diagonal dimension of the semiconductor light-emitting element while housing the semiconductor light-emitting element*", as recited in claim 46 (Application at page 12, line 29-page 13, line 2; page 16, lines 2-6; and Figures 5C and 6). As noted above, this may help to effectively suppress an enlargement of light source size and further enhance the convergence characteristic of light radiated.

Clearly, Roberts does not teach or suggest this novel feature.

Indeed, Roberts is simply directed to a semiconductor radiator emitter package, in which a radiation emitter 202 (e.g., LED chip) is mounted on lead frame 201 (Roberts at col. 26, lines 18-29).

That is, like Soules, nowhere does Roberts teach or suggest that in a horizontal cross section, the recess includes a maximum inside dimension nearly equal to a diagonal dimension of the semiconductor light-emitting element while housing the

semiconductor light-emitting element, as in the claimed invention.

Likewise, Chen does not teach or suggest these features of the claimed invention.

Indeed, Chen simply teaches forming an LED in a groove 11 formed in a silicon substrate 8 (Chen at col. 4, lines 41-65) and forming the structure 23 over the groove 11. This is COMPLETELY unrelated to the claimed invention.

That is, like Soules and Roberts, nowhere does Chen teach or suggest that in a horizontal cross section, the recess includes a maximum inside dimension nearly equal to a diagonal dimension of the semiconductor light-emitting element while housing the semiconductor light-emitting element, as in the claimed invention.

Further, with respect to claim 56, Applicant notes that claim 56 recites "*a submount formed on a concave portion of said electrode, a wiring pattern being formed on a surface of said submount and said light-emitting element being mounted on said wiring pattern*". The Examiner surprisingly alleges that this feature is inherent which is completely unreasonable.

Indeed, Applicant would point out that MPEP 2112 (IV) provides that **the fact that a certain result or characteristic may occur or be present in the prior art is not sufficient** to establish the inherency of that result or characteristic. (e.g., see *In re Rijckaert*, 9 F.3d 1531, 1534, 28 USPQ2d 1955, 1957 (Fed. Cir. 1993). That is, inherency, may not be established by probabilities or possibilities (e.g., see *In re Robertson*, 169 F.3d 743, 745, 49 USPQ2d 1949, 1950-51 (Fed. Cir. 1999)).

Further, MPEP 2112 (IV) also provides that in relying upon the theory of inherency, **the examiner must provide a basis in fact and/or technical reasoning to reasonably support the determination that the allegedly inherent characteristic necessarily flows from the teachings of the applied prior art.** (e.g., see *Ex parte Levy*, 17 USPQ2d 1461, 1464 (Bd. Pat. App. & Inter. 1990).

However, in this case, the Examiner has failed to provide any basis to support his assertion that the Soules device would necessarily include a submount formed on a concave portion of an electrode, a wiring pattern being formed on a surface of the submount and the light-emitting element being mounted on the wiring pattern. Indeed,

Applicant would point out that these features are clearly not necessary in the Soules device. Therefore, the Examiner has failed to show that the features are inherent.

Therefore, neither Roberts nor Chen make up for the deficiencies of Soules.

Therefore, Applicant would submit that these references would not have been combined and even if combined, the combination would not teach or suggest each and every feature of the claimed invention. Therefore, the Examiner is respectfully requested to withdraw this rejection.

### III. FORMAL MATTERS AND CONCLUSION

In view of the foregoing, Applicant submits that claims 7-10 and 46-61, all the claims presently pending in the application, are patentably distinct over the prior art of record and are in condition for allowance. The Examiner is respectfully requested to pass the above application to issue at the earliest possible time.

Should the Examiner find the application to be other than in condition for allowance, the Examiner is requested to contact the undersigned at the local telephone number listed below to discuss any other changes deemed necessary in a telephonic or personal interview.

The Commissioner is hereby authorized to charge any deficiency in fees or to credit any overpayment in fees to Attorney's Deposit Account No. 50-0481.

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**McGinn IP Law Group, PLLC**  
8321 Old Courthouse Road, Suite 200  
Vienna, VA 22182-3817  
(703) 761-4100  
**Customer No. 21254**

Respectfully Submitted,



Phillip E. Miller, Esq.  
Registration No. 46,060